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ABSTRACT

The present study was designed to explore the relationship between the theoretical models of cognitive development proposed by L. S. Vygotsky and J. Piaget. One hundred and four subjects aged four to sixteen years were selected. All subjects were in the average range of intelligence, were in the usual school grade for their age, and had no history of neurological or emotional problems. The subjects were administered the Vygotsky Test of Concept Formation as well as the Piagetian tasks related to the conservation of continuous and discontinuous quantity, weight, area, volume, and density. Subjects responses were scored qualitatively in terms of the described developmental model of each theorist. Developmental levels were converted to a numerical scale within each system and were compared through correlational analysis. The obtained results led to the conclusion that the two theoretical models are closely related in that both Piaget's and Vygotsky's models of cognitive development appeared representative of children's thought processes at all levels of sophistication. (Author)

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A COMPARISON OF THE DEVELOPMENTAL STAGES PROPOSED BY L. S. VYGOTSKY AND J. PIAGET

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A COMPARISON OF THE DEVELOPMENTAL STAGES PROPOSED BY L. S. VYGOTSKY AND J. PIAGET

L. L. Stewin, J. Martin

The purpose of the present investigation was to examine the relationship between the stages of cognitive development proposed by L. S. Vygotsky and by J. Piaget. The theories of Vygotsky and Piaget were selected for study and comparison for a number of reasons, primarily, however, the rationale rests on the similarities of their overall orientation towards research and their philosophies concerning the nature of human intellect. Both vehemently rejected the popular behaviourist philosophy which reduced man's psychological processes to a schema of conditioned reflexes as they felt that human mental activity, particularly at the higher developmental levels, was far too complex to conform to such a simplistic model. Both theorists also felt strongly that human development involved much more than mere imitation of observed behaviour. In the words of Vygotsky, "every external action is the result of an internal genetic law" (Elkonin, 1967, P. 37).

The investigations of both men began by analyzing actual conditions of the child's reality. Their research method involved devising problems requiring certain lines of logical reasoning for their solution, which were then presented to children of various ages. The problems revealed levels of thinking regardless of whether a complete solution was found, and were relatively independent of educational experience and specific cultural activity. The purpose of these experiments was to provide situations which permitted observation of emerging thought processes in addition to completely developed functions, thus yielding

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qualitative rather than quantitative data. Vygotsky's research has been described by Elkonin (1967) as "abstract experimental models rather than empirical studies". The same is true of Piaget's work.

The overall views of man held by Piaget and Vygotsky also correspond closely; both theorists regard the development of individual cognitive processes in the larger content of overall human biological and social evolution. Piaget and Vygotsky sharply differentiate between the higher and lower mental functions on the basis of abstract conceptualization, and both consider the most sophisticated developmental levels of primary theoretical importance. As would be expected, the development of language and its relation to thought is of considerable concern to both investigators.

Piaget's theory of cognitive development has been described as "a progressive structurization whereby actions and intellectual operations become organized into coherent systems," (Inhelder, 1966, p. 160) which applies aptly to Vygotsky's outline as well. Each divides the route to mature thought into "units" (variously labelled periods, phases, stages, etc.), but more important, their views on the nature and function of these units are similar. Both consider the order of attainment invariable, but recognize that individual children reach a given level at different ages. A given stage represents the highest level of conceptualization of which a child is capable at that time, but he will not consistently operate at maximum efficiency so may be expected to use more primitive thought structures as well, depending on the nature of the problem. Piaget assigns approximate age levels to his stages, representative of the average age of attainment of various functions. Vygotsky probably did so as well, but there is no available record of his age parameters. It is suspected

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that Vygotsky worked primarily with school age children, as he was employed in an educationally-oriented institution, and that Piaget's earliest period, the sensory-motor, has no equivalent in the Vygotsky system. Thus this first Piagetian period was not considered in the present investigation.

Vygotsky's Model of Cognitive Development

Vygotsky's ideas are much less well known than those of Piaget, thus a relatively complete description of his developmental stages is included here. A thorough understanding of Vygotsky's terms is also of importance with regard to the later sections on scoring and interpretation of results.

In contrast to the number of ingenious tasks devised by Piaget to provide insight into child thought, Vygotsky is known to have used only one method to assess conceptual level in his subjects. This method is commonly known in Western psychology as the "Vygotsky Blocks", the "Hanfmann-Kasanin Test", or sometimes as the "Concept Formation Test". The test consists of a number of geometric solids which are presented to the subject. One block is visibly coded with a nonsense syllable, but the coding on the others remains hidden. The subject is required to separate the blocks into four groups and provide his reasons for classification. If his first groupings are in error a further clue is provided by revealing the code on another piece. This method is continued until the nonsense words gradually come to be defined by the characteristics of the blocks, and thus, a totally new concept is formed by the subject. This unique instrument was originally devised by Ach, but slight modification of the technique was made by Vygotsky and his co-worker Sakharov (Vygotsky, 1962).

Vygotsky administered this test to a large sample of children of

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various ages. As would be expected, response varied as a function of age level. On the basis of these findings, he formulated the model of conceptual development described below. This model corresponds closely to Piaget's system, notwithstanding the fact that each is based on data gleaned from investigation of quite different areas of child behaviour and problem solving. A diagramatic representation of both models is presented to clarify the phases of development described (See Table 1).

Insert Table 1 about here

Vygotsky divides ascent to mature concept formation into three basic phases, which are in turn divided into several stages. During the first phase, performance on the blocks is characterized by arranging the pieces in "unorganized congeries" or "heaps" which consist of disparate objects grouped together without any apparent basis for classification. This behaviour suggests the meaning of the nonsense syllable is extended in a diffused and undirected manner to include "inherently unrelated objects linked by chance in the child's perception" (Vygotsky, 1962, p. 59). The child often tends to mistake subjective bonds for real ones, however, these primitive associations reflect a degree of reality insofar as they coincide with relations between he child's perceptions.

The first syncretic phase subsumes three distinct stages of performance on the Vygotsky Blocks. The most primitive stage of thinking involves purely random groupings, to which objects are added only on the basis of guesses. When a guess is shown to be in error by examiner clue, the subject guesses again to replace it; hence, this level is known as

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the "trial and error stage". The second stage of sophistication is largely perceptual as it is composed of groups determined primarily on the basis of the spatial position of the blocks. Here the subject forms a "purely syncretic organization" of his visual field as a result of spatial or temporal proximity. The third stage included in the first major phase involves more complex syncretic images, as groups are formed by taking elements from heaps already composed in the manner of the first or second stage. Higher sophistication rests solely on the fact that a two-step operation is involved, as the new combination has no intrinsic bonds, thus no more order than the simple assembling of heaps.

Progress to the next major phase occurs when "objects are united in the child's mind not only by subjective impressions but also by bonds actually existing between these objects" (p. 61). Vygotsky calls this second phase "thinking in complexes" and believes that to achieve it a child must be capable of differentiating between real and subjective bonds, so is growing from syncretism toward objective thinking. Complexes reflect coherent thought, but do not involve objective relationships in the more sophisticated fashion of conceptual thinking. The connections between the elements of a complex are concrete and factual, rather than abstract and logical. The factual bonds are discovered through direct experience, but lack logical unity. The primary difference between a complex and a concept is that the bonds of the former may be of many different kinds. "Any factually present connection may lead to the inclusion of a given element into a complex" (p. 62), while a concept is based on only one attribute.

Five basic types of complexes represent the stages of the second

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phase. The most primitive of these is the associative type, which is based on any bond the child forms between the sample and some other blocks. The sample and other additions need not involve a common trait. Similarity, contrast or proximity between pieces may each variously establish bonds. Vygotsky feels such groupings reflect a change in word meanings from designating a "proper name" of an individual object to representation of a "family name" of a group of objects related in many kinds of ways. The second stage of complexes resembles collections, as objects are placed together on the basis of characteristics that contrast with and complement the sample. Here one attribute is assumed to be the basis of grouping. This stage in the development of child thought is rooted in practical everyday experience where functional groupings such as clothing or cutlery provide models of natural collection complexes. Association by difference is often combined with the earlier associative stage producing groupings rooted in mixed principles.

Vygotsky defines the collection complex as grouping on the basis of functional co-operation or participation in the same practical operation. Collections are followed by chain complexes, which involve "dynamic, consecutive joinings of individual links into a single chain with meaning carried over from one link to the next" (p. 64). The sample is not of central significance, and there is no consistency in the type of connection formed, as the decisive attribute keeps changing throughout the process. An element is included in the group on the basis of one characteristic but is considered in terms of all its other attributes as well. In a concept, on the other hand, one trait is abstracted and considered specifically. Complexes do not include hierarchical organization as all attributes are

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functionally equal. Vygotsky considers the chain complex the purest form of second phase thinking, as it is perceptually concrete and factual. A complex does not rise above its own elements; it merges with the concrete objects that compose it. This fusion of general and particular is distinctively characteristic of all complexes but particularly of those of the chain type. Chain complexes are vaguely defined, so often remote similarity suffices to create a bond.

The fourth stage in complex thinking is reached when the child forms diffused complexes. This type involves fluid indeterminate bonds and is so indefinite as to be virtually limitless. The child stays within the limit of concrete bonds, but as the material on the Vygotsky task differs from typical environmental objects, bonds are tenuously based on dim, unstable attributes. An example of this type of thinking would be choice of trapezoids to go with triangles, as they look like triangles with the tops cut off. Vygotsky considers "the surprising transitions" and "startling associations and generalizations" (p. 66) of children to be the real-life parallels of such performance on the blocks.

The highest level of complex thinking is the pseudo-conceptual stage, so named because generalizations of this type phenotypically resemble mature concepts, but are based on concrete perceptually linked bonds. A pseudo-concept is formed when a child produces a grouping that could "just as well have been assembled on the basis of an abstract concept" (p. 67). Vygotsky is of the opinion that pseudo-concepts predominate over all other complexes in the pre-school child's life because "complexes corresponding to word meanings are not spontaneously developed by the child. The lines along which a complex develops are predetermined by the meaning a given

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word already has in the language of adults" (p. 67). Thus the stable, permanent, everyday meaning of a word is communicated to the child, who forms a complex around it. Vygotsky considers complexes and concepts functionally equal, as pseudo-concepts provide a connecting link between the two in the form of a "complex already carrying the germinating seed of a concept" (p. 69). Verbal communication is a powerful factor in conceptual development, but only because the prevalence of pseudo-concepts permits understanding between individuals at different levels of conceptual sophistication. The child himself is typically unaware of the change from complex to conceptual thinking, as pseudo-concepts are not just a fleeting phenomenon elicited by the blocks test, but a genuine "genetic" development that may be readily observed in everyday life. Vygotsky concedes that the forms of concrete thinking so clearly differentiated by blocks performance "often appear in reality in mixed states" (p. 69).

Vygotsky views the complex thinking of the second phase one root of concept formation, but feels the type of thinking found in the third phase represents a second, independent root. In reality, phase three formations appear in rudimentary form long before the phase of complexes has run its course, but they are considered to be a higher level of development as a degree of abstraction is required. Complexes unify scattered impressions with bonds and relationships and as such create a basis for the more advanced generalizations of the third phase. Abstraction requires singling out elements and viewing them apart from the total concrete entity, thus, genuine concept formation requires separation and unification. Complex thinking cannot both synthesize and analyze, as it by nature involves an overabundance of connections.

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The first stage of the most mature phase of conceptual development occurs in blocks performance when the child groups together maximally similar objects. The test contains no identical blocks; therefore, the members of each group are dissimilar in many respects. This implies that the child is paying more attention to some traits than others, such that this preferential treatment has breached hitherto global perception of the materials. Performance of this type represents the beginnings of positive and negative abstraction.

The next stage, designated "potential concepts", involves grouping on the basis of a single attribute. Again the product is indistinguishable from that obtained from true conceptual thinking, but Vygotsky considers it a precursory stage, as it involves only primitive isolated abstraction. At the complex level, the abstracted element is unstable and loses temporary dominance to other traits. "Only the mastery of abstraction, combined with advanced complex thinking, enables the child to progress to the formation of genuine concepts" (p. 78). The decisive role in this process is played by words, which direct "all the part processes of advanced concept formation" (p. 78).

The final stage of concept formation is reached during adolescence, when primitive patterns gradually give way to true concepts. The adolescent does not immediately cease to use earlier thought forms upon discovery of true concepts, indeed, the former may not predominate many areas of thinking for some time. The transitional character of adolescent thought is evidenced by a striking discrepancy between ability to use concepts and to define them. Vygotsky feels this discrepancy, which can also be noted in adult thought, "confirms the assumption that concepts evolve in ways differing from deliberate conscious elaboration of experience in logical terms. Analysis of reality with the help of concepts precedes analysis of

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the concepts themselves" (p. 79).

Vygotsky's overall view of concept formation is of "movement of thought within the pyramid of concepts, constantly alternating between two directions, from the particular to the general and from the general to the particular" (p. 80). He feels concepts are developed not merely through "interplay of associations" but as a result of an "intellectual operation in which all elementary functions participate in a specific combination" guided by the use of words as a means of centering attention, as well as abstracting, synthesizing and symbolizing traits.

Thus in Vygotsky's model, the child develops from a creature at the mercy of his immediate perceptions to an individual capable of controlling and ordering his perceptions through the application of mature thought processes to sensory data. So, also, does Piaget describe the evolution of the cognitive processes from the sensory, through the concrete, to the abstract levels of functioning.

A Brief Description of Piaget's Model of Cognitive Development

As the Piagetian model is well known in Western psychology, it will be presented in abbreviated and necessarily simplified form within this paper. Basically, Piaget divides the route to mature thought into three major periods composed of stages, and occasional sub-periods and sub-stages. The structure of his developmental framework varies slightly from one publication to the next with regard to minor points, however, his overall position on cognitive change remains consistent. The version described herein is taken from Flavell, 1963. The earliest period of cognitive development is that of sensory-motor intelligence, which encompasses the time from birth to about two years of age. During this period the infant

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gradually advances from a purely reflex level of response to a state where he is aware of, and responsive to, his immediate environment and is able to take direct action upon it at the concrete, purely preceptual level. The child becomes capable of primitive organizations of action to solve immediate practical problems, but is not yet capable of any type of symbolism. Six stages and several smaller substages occur during this period, however, these will not be described in detail as this earliest period was not of concern in the present study.

The second developmental period is of lengthy duration, occurring between two and eleven years of age in most children, and including many important cognitive changes. This is termed the period of concrete operations and is divided into two major sub-periods, the sub-period of pre-operational representations (between two and seven years of age) and the sub-period of concrete operations (from ages seven to eleven). The first sub-period includes three smaller stages - the beginnings of representational thought from two to four years, simple representations or intuitions from four to five and a half years, and articulated representations or intuitions from five and a half to seven years. During this pre-operational sub-period, the child learns to understand and use primitive symbols, thus "interiorizing" the world of action into thought operations. This is a time of symbolic practice and preparation, prior to entering the more sophisticated world of concrete operations. By the time the child has reached this second sub-period, he begins to display stable and orderly adaptations to his environment. He is now able to organize simple cognitive structures into a coherent series or groupings and is at last in possession of co-ordinated, reversible systems of logical operations.

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The child's thinking becomes "mobile", and so loses the ego-centricity and perceptual dependence of earlier phases. He now relies primarily on perception rather than the action-orientation of the sensory-motor period, however, both perception and thoughts are irreversible.

Piaget's final period of conceptual development is that of formal operations, which occurs after eleven years of age. At this level the child is not reality bound in his thought; he is able to conceptualize in the purely abstract world of hypothetical possibility. He is able to reason deductively and adds another dimension to his former concrete operations by now being able to convert them into propositions. Whereas the child in the concrete operations period is largely experience bound and can only extrapolate from the immediate situation in a very limited symbolic sense, the adolescent is capable of beginning investigation in the realm of abstract possibility and then checking his hypotheses with real evidence.

Thus, Piaget and Vygotsky were contemporaries, independently investigating similar problems in separate areas of the world. Despite the parallels noted between their philosophies and their theoretical formulations, Vygotsky has remained a little known figure in Western psychology. Perhaps as a consequence little research has been available examining either his proposed model of cognitive development or his methodology. In contrast, immumerable studies have been reported lending either support or opposition to Piaget's conceptualizations regarding child behaviour and development.

The Present Study

Only one study to date has attempted to compare the work of

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Vygotsky and Piaget, albeit on a rather indirect basis. This study was carried out in 1972 by Denney, and involved a comparison of "free classification procedures" similar to those used by Vygotsky and by Inhelder and Piaget. The stimuli developed for this experiment were a set of 38 wooden blocks which varied in colour and shape. In the "free grouping procedure" (based on Piaget's classification tasks) the subjects, aged two to sixteen years, were told to group the blocks in any way they wanted. In the "verbal labelling procedure" (based on Vygotsky's work) the subjects were shown one block identified by a nonsense syllable and asked to find all other blocks that might be the same type. Obviously the verbal labelling procedure is considerably more difficult than the free classification tasks, thus, it is hardly surprising that Denney found different types of responses offered for each. Indeed, neither theorist has ever claimed any similarity between their classification tasks or the results found from them as Denney acknowledges.

Denney expresses surprise that "neither Vygotsky's nor Inhelder and Piaget's results were replicated" and that "developmental stages such as those reported by Vygotsky and Inhelder and Piaget were not obtained" (p. 221). Rather than a surprising finding, these results would be better considered a foregone conclusion, in view of considerable deviation in experimental methods from those used in the original studies. Denney's stimuli appear similar to those of Vygotsky (although the comparability can only be roughly guessed) but quite different from Piaget's materials. The questions posed to the subjects are close to those of Piaget, but are vastly at variance with Vygotsky's thorough procedure. Thus, the real question involved in this research is the relationship between the devised

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procedures and the original tasks of Vygotsky and Piaget. Until this point is fully explored the implications of Denney's results on the developmental theories of Vygotsky and Piaget cannot be meaningfully assessed. Denney's study makes the error of comparing a relatively minor aspect of Piaget's theory with the basis of Vygotsky's entire model of cognitive development. The present investigation was designed to compare the two theories on a more equal basis. This was to be accomplished by ascertaining the cognitive level of a given child according to each system, and then correlating the results over a representative sample of children.

Method

Each subject was individually administered the Vygotsky Blocks and several Piagetian problems. Responses were recorded by both an audio tape machine and examiner notation. All subject testing and scoring was done by the principal experimenter, however, subject responses were subsequently classified into stages by two independent raters.

The Sample

Performance on both Piaget's and Vygotsky's tasks has been found to be readily influenced by emotional and personality factors (Hanfmann and Kasanin, 1937, 1942; Rappaport, 1941, 1942; Des Lauriers and Halpern, 1947; Fosberg, 1947; Semeonoff and Laird, 1952; Goldschmid, 1967, 1968; Rappaport, Gill and Schafer, 1968), and neurological impairment is of consequence on the Vygotsky Blocks (Hanfmann and Kasanin, 1937, 1942; Rappaport, Gill and Schafer, 1968). Rather suprisingly, the effects of organicity on Piagetian tasks does not seem to have been explored. Educational experience has some effect on Vygotsky scores (Hanfmann and Kasanin, 1937, 1942; Rappaport, 1941, 1942; Aldrich, 1944; Norman, Baker

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and Doehring, 1950; and Rappaport, Gill and Schafer, 1968) but schooling is not a crucial concern with regards to Piaget's theory. Intelligence is a highly significant variable for both theories (Hanfmann and Kasanin, 1937; Rappaport 1941; Aldrich, 1944; Elkind, 1961; Rappaport, Gill and Schafer, 1968; Goldschmid, 1967; Inhelder, 1968).

Four male and four female children at each successive chronological age between four and sixteen years inclusive were selected yielding a total sample of 104 subjects. Only children who fell within the average range of intellectual ability on individual intelligence test administration, and who were in the appropriate school grade for their age were considered as possible subjects. Children whose records were suggestive of possible organic brain damage or of emotional difficulties were also excluded from the sample.

Task Selection

Vygotsky's model of cognitive development is based solely on performance on his Blocks Test, but there is no comparable comprehensive measure in Piaget's scheme, as he prefers to assess cognitive level on the basis of a number of less inclusive tasks. Thus it was necessary to select Piagetian problems for use in the present study that could be considered genuinely representative of Piaget's total developmental model. It was also deemed desirable to choose tasks that could be administered in a relatively short time with a minimum of equipment.

Conservation tasks were chosen as the most appropriate measure of developmental level because the conservation process is considered by Piaget to be a "necessary condition of all rational activity" (1965, p. 3). There are several different types of conservation described by Piaget

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(quantity, length, number, volume etc.) which are characteristically achieved by the child at ages varying from six years to early adolescence. Some of these skills are attained at ages well beyond the range postulated by Piaget as encompassing the sub-period of concrete operations, which immediately suggests formal operational functioning. This aspect of conservation performance is discussed at length by Piaget and Inhelder (1958), with the conclusion that conservation problems are of two types, "simple" or concrete operational, and "complex" or formal operational. All conservation problems involve two types of reversibility of thought, simple inversion negation and reciprocity (which involves recognition of compensatory changes in two related stimuli), but the simple conservations require only sequential application of these reversibilities whereas complex problems necessitate simultaneous use of both types. Thus Piaget considers conservations of quantity, length, number, substance and area to be in the concrete sphere, whereas volume, density, momentum and rectilinear motion conservations are at the formal level. An excellent summary of Piaget's position regarding formal conservations is available in the publications of Brainerd (1970, 1971) and Brainerd and Allen (1971 a, b).

In a discussion of conservation in terms of Piaget's overall developmental theory, Inhelder et al describe formal operations as "characterized by hypothetico-deductive strategy and the potential for utilizing all possible transformations of relations" (1966, p. 160). This suggests that the truly formal operational thinker should be able to successfully perform all types of conservation problems.

Both theoretical and practical considerations resulted in the selection of seven conservation problems for use in this investigation:

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substance, continuous quantity, discontinuous quantity, weight, area (at the concrete level) volume, and density (at the formal level). In addition one Piagetian verbal reasoning problem was included, as it afforded further quick assessment of formal operational cognitive capacity. The Vygotsky Blocks were always administered first owing to the length of the task, and the Piagetian problems were arranged in approximate order of ascending difficulty (as quoted above). The verbal question concluded the battery.

Instruments

The Vygotsky Blocks

The Vygotsky Blocks have been described by Hanfmann and Kasanin as follows - "The experimental material consists of 22 wooden blocks varying in colour, shape, height and size. There are five different colours: red, blue, yellow, green and white; six different shapes: circles, squares, triangles, trapezoids, hexagons, and half-circles; two heights: tall blocks and flat blocks (3/4 in. and 5/16 in. respectively); and two size of top (or bottom) area: large and small blocks (the area of top surface approximately 1 1/3 sq. in. and 3/5 sq. in. respectively). On the under side of each figure...is written one of the following four nonsense words: lag, bik, mur, cev. Regardless of colour and shape, lag is written on all large tall figures, bik on all large flat figures, mur on the small tall ones, and cev on the small flat ones" (1937, p. 521).

The administrative procedure devised by Meece and Rosenblum (1965) was adapted for use in this study. This method is a slight modification of Hanfmann and Kasanin's administration for children, consisting essentially of requiring the subject to assign the blocks to four groups, then to explain the basis of his initial categorizations. The examiner identifies

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one error to the subject by providing a clue to correct grouping, and instructs him to try again. Each "clue" consists of revealing one nonsense syllable and is repeated after each trial until all blocks have been exposed and correctly grouped or have been spontaneously classified by the subject. The subject is guided into verbally formulating a principle to govern correct grouping, the blocks are turned over again and the task readministered without examiner assistance.

Each subject's performance was qualitatively categorized on the basis of Vygotsky's developmental stages by the experimenter and two independent raters. The raters were senior university students with some experience in the area of developmental psychology, but had no familiarity with Vygotsky's theories prior to the experiment. They were given copies of Vygotsky's book, Thought and Language, and their attention was directed to the section describing levels of performance on the Blocks (1962, p. 52 - 81). On the basis of the knowledge gained from this exposure, the raters independently assigned each verbatim copy of the subject's responses to the appropriate cognitive stage. Ratings were transformed to a numerical scale ranging from a score of 1 for the lowest level of development to a score of 11 for the highest for purposes of statistical manipulation. Inter-rater reliability within the present study was .97.

One other qualitative measure was used, based on the scoring procedure devised by Stones and Heslop (1968) and carried out by the experimenter alone. Each successive grouping by a subject was rated along a three stage scale (syncretic, complexive, conceptual) and the subject's overall performance was assigned to the most frequently occuring level of operation. Ratings were then transferred to a three point numerical

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scale.

Piagetian Tasks

All administration procedures were taken from Goldschmid (1967) with the exceptions of the method for presenting the conservation of density task (Brainerd and Allen, 1971b), the check on the conservation of continuous quantity (Piaget, 1967), and the formal operations questions (Piaget, 1950).

Responses to each task were qualitatively judged on the basis of Piaget's descriptions of conservation attainment and overall developmental stage theory (1957, 1968). Subjects who conserved on less than three (of five) concrete tasks and who failed two or more (of three) formal problems were judged to be at the pre-operational level of cognitive development. Children who conserved on three or more of the concrete tasks, but on less than two in the formal realm were considered operational thinkers, and those who "scored" 4 or 5 on the concrete tasks and 2 or more on the formal tasks were rated as being at the formal operational stage. Each response was evaluated twice - once considering the comparative response only, and once considering the explanation given for the phenomenon as well. Subject's performances on each Piagetian task were transformed to a three point numerical scale representing pre-operational, concrete operational and formal operational thinking.

Results

Comparisons of the Piagetian data with the Vygotsky findings were analyzed through the use of correlations. Correlations between level of performance on the eight Piagetian tasks and on the Vygotsky task are contained in Table 2. All are significant at either the .05 or .01 level.

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Insert Table 2 About Here

Table 3 contains the percentages of subjects functioning at the levels of conceptual development proposed by Vygotsky and by Piaget, as observed on the tasks administered. Very few of the subjects were rated at Vygotsky's first phase (4.8%) in comparison with those at Piaget's pre-operational stage (25.96% considering judgement only, 27.88% considering explanation).

Insert Table 3 About Here

The correlations between the numerical scales representing the stages in each theoretical system are shown in Table 4. All are significant at either the .05 or .01 level, despite the finding that few subjects were functioning at the initial phase of development proposed by Vygotsky.

Insert Table 4 About Here

Conclusions and Discussion

The correlational data reported lends support to the hypothesized relationship between the cognitive development models postulated by Vygotsky and Piaget. The finding that so few children aged 4 and above operated in terms of syncretic images suggests that this phase is not comparable to Piaget's pre-operational stage. However the fact that Vygotsky identified syncretic functioning as one of three major phases of

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development suggests that it must appear with frequency at some age. It is therefore suggested that it must occur at younger age levels than those included in the study and may compare more closely to Piaget's sensory motor period.

Vygotsky provides no data regarding the ages of his subjects, nor does he suggest age levels at which the stages of development within his model may be expected to occur. He does hypothesize that conceptual thinking is possible around puberty and that consistent use of the highest level of cognitive functioning is not common until adolescence. These levels of development approximate the chronological level proposed by Piaget for the attainment of formal operational thinking.

The present investigation is assumed to be one of the first attempts in examining the relationships between the developmental models of Vygotsky and Piaget. The findings reported must be considered only as a precursor to more stringent research in this area. As noted previously, sufficient data dealing with early cognitive development was not provided by the subjects age 4 and over chosen for the present study. Considering this limitation the correlational data reported, although not satisfying to the demanding researcher, does provide the impetus for further investigations.

As a final comment regarding the present paper, only aspects of the qualitative data have been presented. Quantitative results of the study are available on request.*

* Dissertation available on request via inter library loan. Martin, Janis A., A comparison of the developmental stages proposed by L. S. Vygotsky and J. Piaget. Unpublished Doctoral Dissertation, University of Alberta, 1973.

TABLE 1

COMPARATIVE DIAGRAM OF THE STAGES OF COGNITIVE DEVELOPMENT OF L. S. VYGOTSKY AND J. PIAGET

Vygotsky's Model	Piaget's Model
	Period of Sensory Motor Intelligence (birth to 2 years)
Phase of Syncretic Images	Period of Concrete Operations (age 2 to 11)
Trial and Error Stage	Subperiod of Pre-operational Respresentations (age 2 to 7)
Perceptual Stage	Stage of Representational Operations (age 2 to 4)
Composite Stage	Stage of Simple Representations (age 4 to 5 1/2)
	Intuitive Stage (age 5 1/2 to 7)
Phase of Complexes	Subperiod of Concrete Operations (age 7 to 11)
Associate Stage	
Collections Stage	
Chaining Stage	
Diffuse Stage	
Pseudo-conceptual Stage	
Phase of Concepts (puberty)	Period of Formal Operations (age 11 years on)
Stage of Maximal Similarities	
Stage of Potential Concepts	
Stage of Genuine Concepts	

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TABLE 2

CORRELATIONS BETWEEN PERFORMANCES ON THE VYGOTSKY TASK AND THE PIAGET TASKS

Vygotsky Blocks	Substance	Continuous Quantity	Discontinuous Quantity	Weight	Area	Volume	Density	Formal Operations Question
Level (Rater #1)	.562	.601	.592	.488	1546	.308	.419	.465
Level (Rater #2)	.562	.601	.592	.488	.546	.312	.419	.458
Level (Rater #3)	.584	.612	.610	.498	.556	.334	.434	.455
Overall Vygotsky Level *	.522	.527	.536	.446	.489	.369	.416	.426

* Based on Stones and Heslop (1968)

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TABLE 3

PERCENTAGE OF SUBJECTS FUNCTIONING AT EACH MAJOR STAGE

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Stage	Percentage
On the Vygotsky Blocks	
Phase of Syncretic Images	4.8
Phase of Complexes	58.65
Phase of Conceptual Thinking	36.53
On the Piagetian Tasks - Considering Judgement Only	
Pre-operational Stage	25.96
Concrete Operational Stage	43.26
Formal Operational Stage	30.76
On the Piagetian Tasks - Considering Explanation	
Pre-operational Stage	27.88
Concrete Operational Stage	50[illegible]
Formal Operational Stage	21.15

TABLE 4

CORRELATIONS BETWEEN THE VYGOTSKY STAGE RATINGS AND THE PIAGET STAGE RATINGS

Vygotsky	Overall Piagetian Stage - Without Explanation	Overall Piagetian Stage - Explanation Considered
Level (Rater #1)	.613	.619
Level (Rater #2)	.609	.623
Level (Rater #3)	.626	.626
Overall Vygotsky Level*	.586	.550

* Based on Stone and Heslop (1968)

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